CORNEA: TOPOGRAPHY, SENSITIVITY

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DECOMPOSITION OF CORNEAL TOPOGRAPHIC DATA INTO COMPREHENSIVE OPTICAL COMPONENTS BY FOURIER SERIES ANALYSIS

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Purpose. To develop a mathematical tool for decomposition of corneal topographic data into comprehensive optical components.
Methods. The polar data values arising from each mire of the TMS-1 corneal topographer were separated into *spherical* (average power), *regular astigmatic* (2' harmonic), and *non-regular astigmatic components* (1', 3', and higher harmonics) by Fourier series analysis. Averages of these optical components were calculated for groups of normal, keratoconic, and transplanted eyes, and the best sphero-cylindrically corrected visual acuity was compared with the amount of non-regular astigmatism. Changes in topographic refractive components were compared with subjective refractive changes in eyes that had undergone myopic-astigmatic excimer laser ablation.
Results. The topography of keratoconic and transplanted corneas were characterized by high amounts of non-regular astigmatic components, which correlated inversely and significantly with the best sphero-cylindrically corrected visual acuity. Fourier series analysis was found superior to conventional keratometry in predicting spherical and regular astigmatic changes in subjective refraction after myopic-astigmatic excimer laser ablation.
Conclusions. Fourier series analysis is a powerful tool to decompose the information of complex topographic corneal images into comprehensive optical components. Furthermore, Fourier series analysis results in a 20-fold reduction in the data necessary for analysis and re-construction of colour-coded topographic images.

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Title:	**CORNEAL PHOTOGRAPHY INSTRUMENTS IN PRK. ARE THERE USEFUL?**
Author(s):	C. Tavares, E. Leite, H. Azevedo, A. Baltar, L.Ribeiro, J.M. Pereira
Setting:	Department of Ophthalmology, Biomedical Institute for Light and Image Research, University of Coimbra, Coimbra, Portugal.
Purpose:	The aim of the study was compare the repeatibility and accuracy of three different corneal photograph instruments (Eyesys, Technomed and Eye Map.) in PRK patients.
Methods:	The main outcomes were corneal power and curvature measurements in the 3 and 5 mm zones. Repeatibility and accuracy were also evaluated. Forty-five patients were evaluated before PRK and two weeks after surgery two calibrated spheres and aspheres were used before each exam and the obtained images were used to test repeatibility and accuracy.
Results:	In the examination performed before surgery, no major differences were found between the different instruments tested. However, when examination were performed after the two weeks after PRK exam showed several differences became apparent between instruments (corneal powers, steppest meridian). Repeatibility and accuracy using standard spheres aspheres showed no differences between instruments.
Conclusions:	Whereas repeatibility and accuracy using standard spheres and aspheres were similar with every instrument in the operated eyes, the study showed that after surgery (PRK) a significant variability was found between instrumentation

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PRECISION OF THE ULTRASOUND BIOMICROSCOPE (34 MHZ) IN MEASUREMENT OF CORNEAL CURVATURES

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Purpose
The curvatures of the anterior and posterior corneal surface can be investigated at high resolution using the 34 MHz-ultrasound biomicroscope (UBM). The aim of this paper is to study how precisely the radii of the anterior and posterior corneal curvature may be estimated from UBM-images.

Method
One examiner performed keratometry of the central cornea and UBM-imaging of the same orientation on 40 eyes of 40 patients. With each eye, two independent UBM-images were realized, that fulfilled the following criteria for an essentially perpendicular direction of the ultrasound on the central cornea: vertical orientation of cornea, iris and lens in the UBM image, bright central reflex from anterior and posterior corneal and anterior lens surface, simultaniously visible , non-dilated pupil. Spherical radii were then fitted to the anterior and posterior corneal curvatures of the UBM-images using computer graphics. Their values were correlated with the corneal radii obtained from corneal keratometry.

Results
The precision of corneal radii determination by means of UBM is, apart from possible systematic problems, limited by two statistical errors:
1. an error due to the individual image analysis,
2. an error due to differences between different UBM-images of the same eye.
The mean overall error in the measurement if the anterior corneal radii, resulting from both factors, accounted for 5% of the respective absolute values. The error of the posterior curvature must be expected to be at least of the same order.

Conclusion
UBM is capable of measuring anterior and posterior corneal radii. However, errors of approximately 5% have to be expected.

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Title:	**PATIENTS PAIN PROFILE DEFINITION AND ANALGESIC REQUIREMENTS.**
Author(s):	E. Leite, A. Pedruco, B. Oliveiros, C. Gonçalves, C. Lobo, J. Mira.
Setting:	Department of Ophthalmology, Biomedical Institute for Light and Image Research, University of Coimbra, Coimbra, Portugal.
Purpose:	Define patient pain profile (cognitive, perceptual and affective) and test different analgesic protocols according to specific requirements.
Methods:	A group of 30 patients were assessed pre and postsurgery by psychological test battery (including Beek Depression Inventory, Eysenk Personality Inventory, State-Trait Anxiety Inventory), the Visual Analogue Scale and the McGill Pain Questionnaire.
Results:	Data were analyzed using Wilcoxon Test. Results indicate that postoperative outcome measures could be predicted by a set of variables that includes anxiety, extroversion, depression, educational and cultural level, perception and physical status. Extensive data from each item and correlation with medication are presented.
Conclusions:	Determination of levels of pain and patient profile could be predicted through a psychological test battery and attitudes toward medication could be specifically provided in each patient minimising post-operative pain and reducing the medication risk.